

## **REMARKS**

### **I. STATUS OF THE CLAIMS**

Claims 7, 8 and 14, 16-19 have been amended. No claims are cancelled or added. Therefore, claims 1-24 are pending.

### **II. ALLOWABLE SUBJECT MATTER**

Applicants gratefully acknowledge the Examiner's indication of allowable subject matter in original claims 7-8 and 14-19. Amended claim 7 now includes the limitations set forth in original claim 7, as well as the limitations of base claim 1 and intervening claim 2. Accordingly, claim 7 should now be allowable, and Applicants respectfully request withdrawal of the rejection and a timely notice of allowance for claim 7. Claim 8 depends from claim 7 and should be allowable for at least this reason as well.

Amended claim 14 now includes the limitations set forth in original claim 14, as well as the limitations set forth in base claim 10. Accordingly, claim 14 should now be allowable, and Applicants respectfully request withdrawal of the rejection and a timely notice of allowance for claim 14. Claim 15 depends from claim 14 and should be allowable for at least this reason as well. Amended claims 16-19 now include the limitations set forth in original claims 16-19, as well as the limitations set forth in base claim 10. Accordingly, claims 16-19 should now be allowable, and Applicants respectfully request withdrawal of the rejection and a timely notice of allowance for claim 16-19.

### **III. CLAIM REJECTIONS – 35 U.S.C. § 102**

The Examiner has rejected claims 1-9, 11, 14-20, 21-22 and 24 under 35 U.S.C. § 102(b) as being anticipated by Carrington et al., (U.S. Patent No. 5,737,456) (“Carrington”). In order to maintain the anticipation rejection, every element of Applicant's claimed invention must be

"identically shown" in the Carrington reference. *See In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990) ("For a prior art reference to anticipate in terms of 35 U.S.C. § 102, every element of the claimed invention must be identically shown in a single reference."). Applicants respectfully traverse the rejection and provide the following remarks.

**A. Claim 1**

Applicants respectfully submit that Carrington does not disclose the limitations recited in claim 1. Claim 1 requires an imaging method comprising "displacing an imaging device in one dimension while acquiring an image of an object, thereby blurring the image" (emphasis added). Claim 1 further requires "deconvolving the blurred image to generate a multidimensional representation of the object" (emphasis added). The term "multidimensional representation" is explained on page 7 of Applicant's specification, which provides:

By "multidimensional representation" of the object, it is simply meant that the final image also contains information about the object along the dimension of motion. In the case where *focus* is varied during image acquisition (the z direction is the direction of motion), the techniques of this disclosure may be used to create a 2D projection image of a 3D region of the sample under study. The 2D projection image is a "multidimensional representation" since it contains information about a third dimension – depth of the sample. Likewise, using the techniques described above, one may generate a one dimensional (1D) projection image of a 2D area. The 1D projection image is therefore a multidimensional representation.

In contrast, Carrington discloses acquiring multiple images and processing the multiple images to obtain a three-dimensional image. As an initial matter of distinction, Carrington does not disclose that any of the multiple images are acquired while displacing the imaging device. Applicants refer to remarks made in regards to claims 1 and 2 of the prior response dated November 12, 2007, incorporated herein by reference.

Carrington clearly indicates in numerous instances that the imaging device is not displaced while acquiring an image of the object. For example, Carrington states: “[T]he sections are acquired by moving a lens 20 to different positions along the z axis relative to the bead, and then digitally recording the image.” Carrington, col. 5, lines 6-9 (emphasis added).

Another difference between Carrington and the claimed invention is that Carrington does not disclose processing the image to generate a multidimensional representation of the object. Instead, Carrington discloses processing multiple images to generate a three-dimensional image. Carrington makes numerous references to the fact that multiple images are processed to create the three-dimensional image. For example:

The method also simplifies and expedites three-dimensional imaging reconstruction. Such images can be reconstructed using only a small number of two-dimensional image planes which can be taken at non-uniform distances along an axis of the sample.

Carrington, col. 2, lines 16-20 (emphasis added). The reference does not state that a three-dimensional image can be reconstructed by using a single two-dimensional image plane taken at a single distance. Instead, Carrington clearly states that multiple images must be taken.

Carrington further states:

Three-dimensional images of the sample are reconstructed by acquiring sections spaced along a particular axis of the sample. Referring now to FIG. 2B, sections may be obtained by positioning the lens 20 at various distances from the sample 16 (shown in the figure as being along the z axis), collecting light emanating primarily from a section 50 lying at the focal plane (spaced by a distance f) of the lens 20, and then imaging this light onto the optical detector.

Carrington, col. 6, lines 49-56 (emphasis added). Again, the reference clearly states that multiple images are required to reconstruct a three-dimensional image. Such systems are distinguished by the invention of claim 1, which requires deconvolving a blurred image (rather than using multiple images) to generate a multidimensional representation.

“During examination, ‘claims . . . are to be given their broadest reasonable interpretation consistent with the specification, and . . . claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art.’” *In re American Academy of Science Tech Center*, 367 F.3d 1359, 1369, 70 USPQ2d 1827, 1834 (Fed. Cir. 2004); *see* MPEP § 2111.01. Applicant’s respectfully submit that the term “image” cannot be interpreted as “multiple images.” Such a construction is clearly disavowed in Applicant’s specification, which recites:

In step 302, a shutter of an imaging device is open to begin acquisition of an image of an object. In step 304, focus is varied while that shutter is open, allowing for the acquisition of information about the object in the direction of focus without having to take multiple, distinct slice images.

Specification, p. 8, line 29 – p. 9, line 2 (emphasis added). Because an “image” cannot be reasonably interpreted as “multiple images”, Carrington does not anticipate claim 1.

While it is true that a reference that discloses “A+B+C” anticipates a claim of “A+B”, that is not the situation with Carrington and claim 1. Claim 1 requires deconvolving a blurred image to generate a multidimensional representation of an object. As illustrated in the citations above, Carrington instead discloses processing multiple images to create a three dimensional image. Carrington never discloses that a multidimensional representation can be generated by deconvolving a single blurred image. In fact, Carrington explicitly states that more than one image is required to generate its three-dimensional image. “Once the necessary sections are acquired, the data is processed using the known PSF and the method described below to determine the high-resolution image.” Carrington, col. 7, lines 3-6. Because multiple sections are necessary for the system disclosed in Carrington, it cannot deconvolve a blurred image to generate a multidimensional representation.

In summary, Carrington does not disclose “deconvolving the blurred image to generate a multidimensional representation of the object.” Furthermore, as explained in Applicant’s previous response, Carrington does not disclose “displacing an imaging device in one dimension while acquiring an image of an object, thereby blurring the image.” For at least these reasons, Carrington does not anticipate claim 1. Accordingly, Applicants request withdrawal of the rejection and timely allowance of claim 1.

**B. Claim 2**

With respect to claim 2, Applicants again refer to remarks made in the previous response which detailed how Carrington did not disclose “varying the focus of an imaging device while acquiring an image of the object.” Furthermore, as explained in the remarks above regarding claim 1, Carrington does not disclose “deconvolving the blurred image to generate a multidimensional representation of the object. For at least these reasons, Carrington does not anticipate claim 2. Accordingly, Applicants request withdrawal of the rejection and timely allowance of the claim.

**C. Claims 3-5, 6, and 9**

Claims 3-5, 6 and 9 depend from claim 2 and are therefore allowable for at least the reasons provided above. In addition, claims 3-5, 6 and 9 may contain additional limitations that are not disclosed by Carrington.

For example, claim 5 also requires “varying the focus while a shutter of the imaging device is open.” The Examiner cites the following passage of Carrington as support for this limitation:

45 Since the images for each plane may be recorded simultaneously for the entire field, information for the three-dimensional image can be acquired in relatively brief intervals (as short as 15 msec.). This minimizes motion-related effects in the image which can lead to blurring.

Carrington, col. 8, lines 45-49.

Nowhere does the cited passage disclose "varying the focus while a shutter of the imaging device is open." Again, the cited portion of the reference makes no mention of varying the focus, much less doing so while the shutter is open. In addition, the cited passage explicitly mentions the minimization of motion-related effects in the image. Such effects, however, are increased, rather than minimized, when the focus is varied "while a shutter of the imaging device is open". For at least the reasons provided above, Carrington does not anticipate claim 5, and Applicants respectfully request withdrawal of the rejection and timely allowance of the claim.

#### **D. Claims 11, 14-19**

Claims 11 and 14-19 depend from claim 10 and are allowable for at least the reasons provided below in the discussion of claim 10. In addition, claim 15 is allowable for at least the reasons provided above in the discussion of claim 5. Therefore, Carrington does not anticipate claims 11 and 14-19. Accordingly, Applicants respectfully request withdrawal of the rejection and timely allowance of the claims.

#### **E. Claims 20-22**

In support of the rejection of claim 20, the Examiner states only: "see the rejection of claim 1 above." Action, p. 4. Applicants initially note that claim 20 comprises additional limitations that are not present in claim 1. Specifically, claim 20 requires a "processor in operative relation with the imaging device and configured to execute machine-readable instructions for deconvolving a resulting blurred image to generate a representation of the

object". The Examiner has not cited any portion of Carrington as disclosing such a processor. Assuming, for sake of argument, that Carrington does disclose such a processor, the reference does not disclose other limitations of claim 20. For example, Carrington does not disclose "an imaging device configured to vary its focus while acquiring an image of an object", for at least the reasons explained above in the discussion of claim 2. Therefore, Carrington does not anticipate claim 20. Accordingly, Applicants respectfully request withdrawal of the rejection and timely allowance of the claims.

Claims 21 and 22 depend from claim 20 and are therefore allowable for at least the reasons provided above in the discussion of claim 20. In addition, claim 21 is allowable for at least the reasons provided above in the discussion of claim 3. Therefore, Carrington does not anticipate claims 21 and 22. Accordingly, Applicants respectfully request withdrawal of the rejection and timely allowance of the claims.

#### **F. Claim 24**

With respect to claim 24, Carrington does not disclose a "means for allowing an image device to vary its focus while acquiring an image of an object" for at least the reasons provided above in the discussion of claim 2. Accordingly, Applicants respectfully request withdrawal of the rejection and timely allowance of the claims.

### **III. CLAIM REJECTIONS – 35 U.S.C. § 103**

The Examiner has rejected claims 10, 12-13 and 23 under 35 U.S.C. § 102(b) as being unpatentable over Carrington et al., (U.S. Patent No. 5,737,456) ("Carrington") in view of Subbarao (U.S. Patent No. 5,193,124) ("Subbarao"). Applicants respectfully traverse the rejection.

#### A. Claim 10

Claim 10 claims an imaging method comprising a series of steps. Step (b) requires “varying the focus of the imaging device while collecting the acquired image, thereby blurring the image.” For support of this limitation, the Examiner cites the same portions of Carrington that were referenced in the rejection of claim 2 (*i.e.* col. 3, lines 10-16; col. 4, lines 37-62; col. 8, lines 28-65). Applicant’s discussion of Carrington in Section II is incorporated herein by reference.

For at least the reasons provided in the discussion of claim 2 above, Carrington does not disclose varying the focus of the imaging device while collecting the acquired image. Therefore, Carrington does not disclose step (b) of claim 10. In addition, Carrington does not suggest varying the focus while collecting the acquired image, and in fact, teaches away from such an action. As explained above, Carrington teaches moving a lens and then capturing an image (*see* col. 5, lines 3-11). Furthermore, Carrington teaches the minimization of motion-related effects (*see* col. 8, lines 45-49). Varying the focus of the imaging the while collecting the acquired image would increase, rather than minimize, such effects.

In addition, Subbarao does not teach varying the focus of the imaging device while collecting the acquired image. Subbarao discloses a method and apparatus for determining the distance of a surface patch of an object from a camera system. Subbarao, Abstract.

Claim 10 is therefore different from Carrington and Subbarao for at least the reason that Carrington and Subbarao do not provide for varying the focus of the imaging device while collecting provided above. As a result, the combination of Carrington and Subbarao would not teach the invention claimed in claim 10.

Furthermore, it would not have been obvious to modify either Carrington or Subbarao to vary the focus of the imaging device while collecting the acquired image, thereby blurring the image. As explained above, Carrington teaches away from such a method. For at least these reasons, Carrington and Subbarao do not render obvious the invention claimed in claim 10. Accordingly, Applicants respectfully request withdrawal of the rejection and timely allowance of the claim.

**B. Claims 12-13**

Because claims 12-13 depend from claim 10, these claims are allowable for at least the reasons provided above with respect to claim 10. In addition, these claims may contain additional limitations that further evidence their patentability. Accordingly, Applicants respectfully request withdrawal of the rejection and timely allowance of the claims.

**C. Claim 23**

Claim 23 depends from claim 20, and is therefore allowable for at least the reasons provided in the discussion of claim 20 above. Accordingly, Applicants respectfully request withdrawal of the rejection and timely allowance of the claim.

#### IV. CONCLUSION

Applicant believes that the present document is a full and complete response to the Office Action mailed July 3, 2007. The present case is in condition for allowance and such favorable action is requested.

The Examiner is invited to contact the undersigned Attorney at (512) 536-3072 with any questions, comments or suggestions relating to the referenced patent application

Respectfully submitted,



Christopher W. Spence  
Reg. No. 58,806  
Attorney for Applicants

FULBRIGHT & JAWORSKI L.L.P.  
600 Congress Avenue, Suite 2400  
Austin, Texas 78701  
(512) 474-5201

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